

497. Next with respect to the quantity of elements evolved. On using the volta-electrometer, it was found that, whether the strongest or the weakest muriatic acid were used, whether chlorine alone or chlorine mingled with oxygen appeared at the *anode*, still the hydrogen evolved at the *cathode* was a constant quantity, *i.e.* exactly the same as the hydrogen which the *same quantity of electricity* could evolve from water.

498. This constancy does not decide whether the muriatic acid is electrolysed or not, although it proves that if so, it must be in definite proportions to the quantity of electricity used. Other considerations may, however, be allowed to decide the point. The analogy between chlorine and oxygen, in their relations to hydrogen, is so strong, as to lead almost to the certainty, that, when combined with that element, they would perform similar parts in the process of electro-decomposition. They both unite with it in single proportional or equivalent quantities; and the number of proportionals appearing to have an intimate and important relation to the decomposability of a body (432), those in muriatic acid, as well as in water, are the most favourable, or those perhaps even necessary, to decomposition. In other binary compounds of chlorine also, where nothing equivocal depending on the simultaneous presence of it and oxygen is involved, the chlorine is directly eliminated at the *anode* by the electric current. Such is the case with the chloride of lead (131); which may be justly compared with protoxide of lead (138), and stands in the same relation to it as muriatic acid to water. The chlorides of potassium, sodium, barium, etc., are in the same relation to the protoxides of the same metals and present the same results under the influence of the electric current (138).

499. From all the experiments, combined with these considerations, I conclude that muriatic acid is decomposed by the direct influence of the electric current, and that the quantities evolved are, and therefore the chemical action is, *definite for a definite quantity of electricity*. For though I have not collected and measured the chlorine, in its separate state, at the *anode*, there can exist no doubt as to its being proportional to the hydrogen at the *cathode*; and the results are therefore sufficient

to establish the general law of *constant electro-chemical action*
in the case of muriatic acid.

500. In the dilute acid (496), I conclude that a part of the water is electro-chemically decomposed, giving origin to the oxygen, which appears mingled with the chlorine at the *anode*.